Appendix E
SOW 6643-A-0398

Weapon Systems Trainer (WST)

KC-130J

2F199 S/N 0003

TABLE OF CONTENTS

Appendix E
SOW 6643-A-0398

Trainer Description for Device 2F199
KC-130J Weapon System Trainer (WST)
Located at MCAS Futenma, Okinawa, Japan

1.0 TRAINER DESCRIPTION

1.1. Function and General Description. DEVICE 2F199 Weapon Systems Trainer (WST) S/N 0003, Located at MCAS Futenma, Okinawa, Japan. The KC-130J WST simulates the operational and performance characteristics of the KC-130J aircraft in order to facilitate flight training and cockpit familiarization under normal, adverse, and emergency conditions. WST systems and equipment function interactively to simulate the aural, visual, and motion conditions experienced during actual KC-130J aircraft operations. Performance simulation includes all normal and emergency operations of the WST on the ground and in flight. Simulator flight performance is determined by aircraft weight and balance, aerodynamic characteristics, and engine performance. Both aerodynamic and engine performance are influenced by atmospheric and environmental conditions. Task inputs provided by the instructor are sent to the computer and interface system where they are processed into the corresponding command signals. These command signals are then sent to the appropriate simulator systems to produce the effects and indications required for the training scenario. Any resulting aircrew response is then routed back to the computer and interface system. Performance measurements are then sent back to the instructor station for evaluation.

1.2. Cockpit. The Trainers cockpit is a full-scale replica of the KC-130J aircraft. Direction and movement of controls and switches are identical to those of the aircraft and simulates all cockpit instrument indications automatically in response to control movement by a crewmember, simulated aircraft performance, instructor-inserted actions, or external simulated environmental effects, such as turbulence or wind shear. All displays, instruments, panel assemblies, switches, levers, knobs, and lights of the trainee station are provided to replicate the form, fit, function, feel, and finish of the aircraft, replicate both the static and dynamic responses and be compatible with night vision devices (NVD).

1.2.1. Cockpit Sound System. The audio system simulates all the audio functions associated with the actual aircraft communication, navigation and intercommunication systems. The audio system components are located in the S4 Computer Cabinet as well as in the Flight Compartment Pilot and Co-Pilot Misc. Electrical Equipment Panels. However, the actual aircraft audio equipment is mounted in suitable locations in and around the flight compartment and the IOS station. The audio system is comprised of the following main elements:

(a) Digital Audio Communications System (S4A21).

(b) Remote Interface Units (S4A29RIU1, S4A29RIU2, 1A1A13A3, 1A1A14A3, 1A1A13A5, and 1A2A1A4).

(c) Actual aircraft audio equipment, such as audio control panels (for the Pilot, co-Pilot, Instructor and Observers), microphones, headsets and public address speaker.

Appendix E
SOW 6643-A-0398

1.3. Crew Station. A combination of actual and simulated KC-130J aircraft components is used to replicate the KC 130J crew station and create a realistic training environment. Actual KC-130J cockpit furnishings and accessories are also used to further enhance the training environment. Simulator crew station systems consist of simulated and stimulated aircraft equipment as controlled by the host computer simulation software, along with flight crew inputs (equipment setup) and instructor training exercise control. Crew station systems equipment applies to Digital Input (DI) and Analog Input (AI) signals via the interface system to the host computer. Host computer simulation software coupled with hardware, in response to these inputs, generates Digital Output (DO) and Analog Output (AO) signals via the interface to the crew station systems equipment. These DOs and AOs control and stimulate various systems/equipment displays, gages, indicators, and instruments for realistic system indications and operation.

1.4 Instructor Operator Station (IOS). The Instructor Operator Station (IOS) provides two (2) primary functions: controlling the training scenario, and monitoring and evaluating technical performance of crew members. The IOS provides the instructor with the ability to insert malfunctions, reset AIM/IOS parameters, and control the external Electrical Power State. The IOS consists of a computer and its peripheral equipment, a touch screen monitor, and a power distribution panel. The IOS Computer is the main interface between the IOS monitor and the aircraft interface monitor (AIM). IOS display pages are discussed in the Instructor Utilization Handbook, BA0002-IUH-001.

1.5 Motion System. The motion system consists of six (6) hydraulic servo actuators with control servo valves, anchoring devices, and other major and minor hardware. These actuators support the motion platform, and simultaneously impart rotational and transitional motion to it, in response to input signals from the Digital Control system. The motion system is a “6 DOF” system. The motion system will not be installed on the device located at MCAS Futenma and will be kept in a controlled environment storage facility, site TBD.

1.6 Visual System. The KC-130J visual system uses a commercial-off-the-shelf (COTS) Vital 9 Flight Safety Image Generator (IG) that functions interactively with the host computer to provide the visual images required for flight training. The IG is comprised of the following major components:

1.6.1. Visual Control Equipment. The Visual Control Equipment (VCE) is comprised of the Visual Control Computer (VCC), the Redundant Array of Independent Disks (RAID) computer and the associated terminal. The VCC is used to activate/deactivate the visual database, perform diagnostic procedures and develop the database. The VCC is connected to and controls the RAID, which is used for database storage.

1.6.2. Channel Processing Equipment. The Channel Processing Equipment (CPE) is comprised of the Image Generator Cabinet (V1) and the associated channel processing chassis. A power panel is installed on each cabinet and contains various switches, circuit breakers and indicators, along with utility power outlets. Voltmeters are also provided in the upper portion of the cabinet to allow monitoring of the cabinet voltages. The channel processor chassis contains the various circuit card assemblies required to generate visual images for a specific IG field of view.

1.6.3.Visual Display Equipment.
The visual display equipment provides the viewable image to the Crewstation portion of the simulator assembly. The visual display equipment is located on the upper trainer deck. A COTS SkyLight Projector System is used in the KC-130J WST configuration and is comprised of the following assemblies:

1.6.3.1 Display Control Unit (DCU). The DCU contains the projector electronics for the IG interface circuitry, small signal video, small signal geometry, convergence, focus and digital processing circuits. The DCU also contains the Deflection amplifiers, focus amplifiers, power regulation/distribution components and the low and high voltage power supplies.

1.6.3.2. Projector Head Unit (PHU). The PHU contains the red, green and blue Cathode Ray Tubes (CRTs) along with associated deflection, focus and convergence yokes. Additionally, video output amplifiers, G2 amplifiers and beam centering amplifiers are housed in the PHU.

1.6.3.3. Digital Alignment Unit (DAU). This hand held unit is used to perform convergence and geometry alignments as well as intensity, shading, and focus adjustments on all of the projectors used in the system.

1.7 Control Loader System. The purpose of the control loading system is to provide the simulated loading effects on the manually operated flight controls used in all normal and emergency aircraft operations. The loading for each flight control is provided by an associated load unit, which is connected to the flight control either directly or through mechanical linkages. The load units that provide the simulated loading effects on the flight controls can be divided into two categories, dynamic load units and static load units. Both dynamic and static load units are utilized on this trainer.

1.8. Computer System and Peripherals. The simulator’s host computer workload is split between two computers, the Linux Host and the Windows (I/O) Host computers. These computers work together to provide the processing power and memory capacity required for real-time simulation. These computers are pre-loaded with commercial off-the-shelf software and custom designed software. Both of these computers working together are the master controller of the simulator.

The Linux host and the I/O host communicate with other workstations and peripherals through various signal protocols. Ethernet cards mounted within the workstations provide the ability to exchange data with the simulator’s subsystems. The different Local Area Networks (LANs) are used to connect computers, printers, and other electronic devices together to provide the simulated training environment. Most of the computer systems and their peripherals are contained in 19-inch rack mounted cabinets that contain adjustable mounting brackets, power bars and air-flow ducting. Each cabinet also provides easy access to all items within the cabinet from the front and back. In the computer cabinets (S1, S2, etc.) an electrical junction box located under each computer cabinet distributes AC power from the P1 cabinet to the host computer and peripherals. Power bars are connected to the electrical junction box and are used to further distribute the electrical power to the various computer peripherals.

Appendix E
SOW 6643-A-0398

1.9 Oxygen System. The purpose of the simulated oxygen system is to simulate the crew oxygen supply system of the actual aircraft. A customer furnished breathable air bottle provides a supply of breathable air to the inlet of a distribution system. The distribution system, when commanded by the computer interface, distributes the breathable air to oxygen masks at the pilot and copilot crew stations, at the augmented crew station, and in the ceiling of the non simulated area above the instructor station.

2.1 Illustrations.

Complete lists of illustrations are available at each training device location.

3.1 Mission Essential Subsystem Matrix (MESM): N/A

4.1 Contracted Training Time (CTT).

DEVICE: 2F199 Weapon System Trainer
SERIAL NO: 0003
LOCATION: MCAS Futenma, Japan

Training Operations shall be provided in each FY as per exercised contract CLIN/SLIN from one of the stair steps below:

CONTRACTED TRAINING TIME – Hours Per Week (HPW)			
20 HPW	40 HPW	60 HPW	80 HPW
0900-1200* (MON-FRI)	0800-1600* (MON-FRI)	0700- 1900* (MON-FRI)	0700-2300* (MON-FRI)

* The above CTT options represent continuous hours of CTT Monday - Friday. The start/stop time of the CTT option is for information purposes only and may vary as required by the scheduling authority.

Note: Training is planned for (0) Saturdays and (0) Sundays per month.

Appendix E
SOW 6643-A-0398

5.1 Aircraft Common Equipment (ACE)

Complete list of ACE can be found in the inventory list provided at each site.

The Material Support Package (MSP) inventory of this solicitation will be determined by the results of CDRL A005 "COMS/CMS CONTRACTOR INVENTORY/UTILIZATION REPORT OF GFP/GFI". The results of the transition inventory will be verified and signed by the site COR prior to Contractor's submission of CDRL A002 to the Government.

NOTE: Whenever minor configuration changes, calibration or adjustment of aircraft common equipment is required for use in the trainer, such information shall be provided in this Appendix.

5.2 Trainer Equipment. Depot level (D-level) maintenance for the following trainer equipment is the responsibility of the government.

Complete list of D-level trainer equipment will be provided at each site.

5.2.1 Trainer Support Package (TSP): Includes Tools/Support Equipment, Spare Parts, Technical Data Support Package, and Software Support Material. The formal inventory (i.e. tools/support equipment, spare parts, technical data support package, and software support material, etc.) shall be those items identified during the mobilization period and stated in the yearly Inventory/Utilization Data Report. The Contractor shall comply with the development, maintenance and submission requirements for this report, as stated in the applicable CDRL item."

6.1 Partial Mission Capability (PMC) Standard.

PMC is the material condition of a training device that cannot perform all of its missions.

Failed Sub-System	
Component	% Degradation
Any VMS Component	100%
IOS	100%
EICAS	100%
Visual	92%
MDL	27%
DIGMAP	30%
BASIC INAV (GPS/INS)	34%
EW suite	16%
Left MFD	100%
Right MFD	23%
FD	97%
Basic ENAV	24%
Motion	20%
Aural	20%
FLIR	38%
TEN	26%
NVG HUD	22%
SFD	96%
Basic Moving Models	11%

Appendix E
SOW 6643-A-0398

Lead ship Rec/Playback	4%
RADALT	93%
Debrief Station	10%
Left RFIS	100%
Right RFIS	23%
Standby Instruments	7%
Networked Players	19%

1. This matrix is based on the current T&R Syllabus Vol 8. Revisions of the T&R Syllabus will drive changes to this PMC Chart.

2. The COR will assign PMC status in the event of a system failure not listed above based on the impact to training. The PMC factor shall not exceed 10%.